HYPERLEDGER

BUENOS AIRES

May 5, 2016

#HyperledgerArg

Meetup Sponsors:

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Introduction to Blockchain & Hyperledger Project

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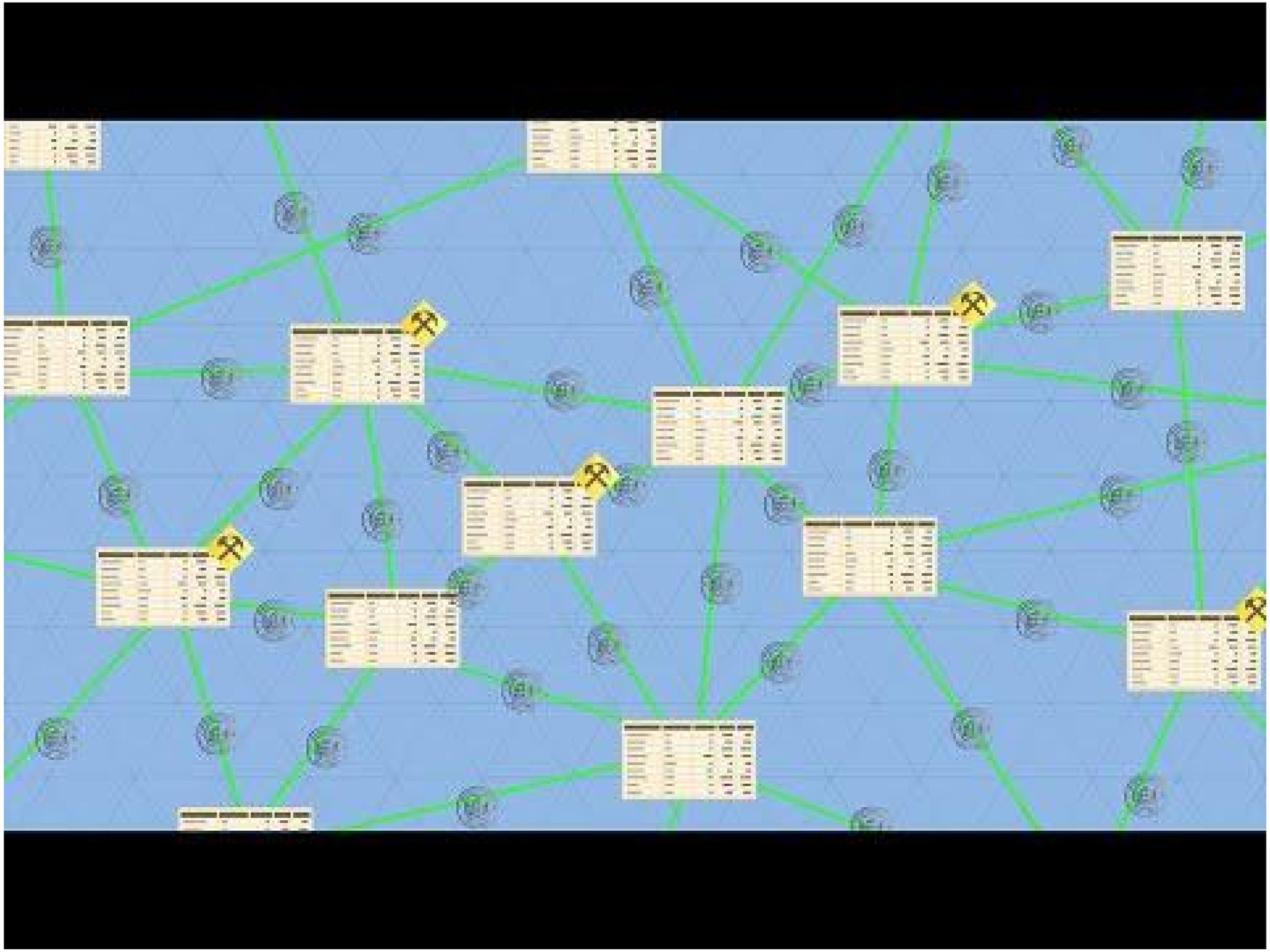
Agenda

- Blockchain
  - Brief History & Intro
  - Key Conpects
  - When?
  - Use cases
- Hyperledger Project
  - What? Why?
  - Introduction
  - Current status
  - Architecture
  - Demo?

Cheating?
Lazy?
Kind of..

https://goo.gl/eulaVd

Awesome video
(till 3’)



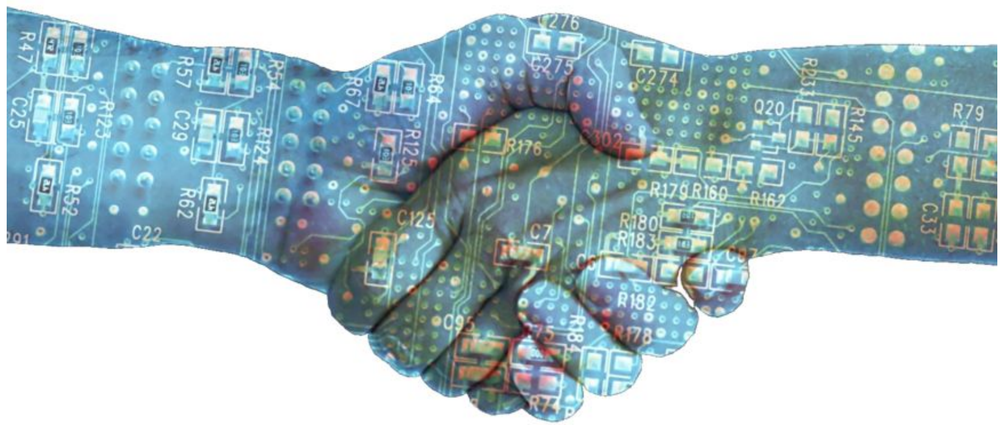
Key Concepts

1. Bye bye Trusted Third Parties
2. Fully distributed unique “public” ledger
3. Transactions mathematically verified and persisted (time-stamped)
4. Consensus

Shared single source of truth

Blockchain

- Peer-to-Peer distributed ledger
- Robust
- Multi purpose
- Open by design
- Permissioned
- Transactional



An operating system for interactions

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Blockchain - Interaction

When you want **public records** of **something** that happened at **some point in time** that is **verifiable** and **not in the control** of any one entity

Blockchain - Game changer

Reduces settlement time from days to near instantaneous

Removes overhead and cost intermediaries

Reduces risk of collusion and tampering

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Blockchain - Use Cases

- Of course: cryptocurrency
- Proof of ownership (physical and digital assets)
- Smart Contracts
- Financial transactions
- Certificates
- Proof of authenticity, existance
- Decentralized patient records
- Voting

Just a few startups

Blockchain Use Cases: Comprehensive Analysis & Startups Involved

Let's Talk Payments LTP

WHAT IS THE HYPERLEDGER PROJECT?

The Hyperledger Project is a collaborative effort created to advance blockchain technology by identifying and addressing important features for a cross-industry open standard for distributed ledgers that can transform the way business transactions are conducted globally.

Why Hyperledger?

"As with any early-stage, highly-complex technology that demonstrates the ability to change the way we live our lives and conduct business, blockchain demands a cross-industry, open source collaboration to advance the technology for all."

— Jim Zemlin, Executive Director, Linux Foundation

Some of the most innovative companies in the world are actively engaged -- It is a global collaboration of the best and brightest in Finance, Banking, Internet of Things, Supply Chains, Manufacturing and Technology.

PREMIER

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High performance. Delivered.
CME Group
DEUTSCHE BÖRSE GROUP
Digital Asset
DTCC
FUJITSU
HITACHI
Inspire the Next
IBM
intel
J.P.Morgan
R

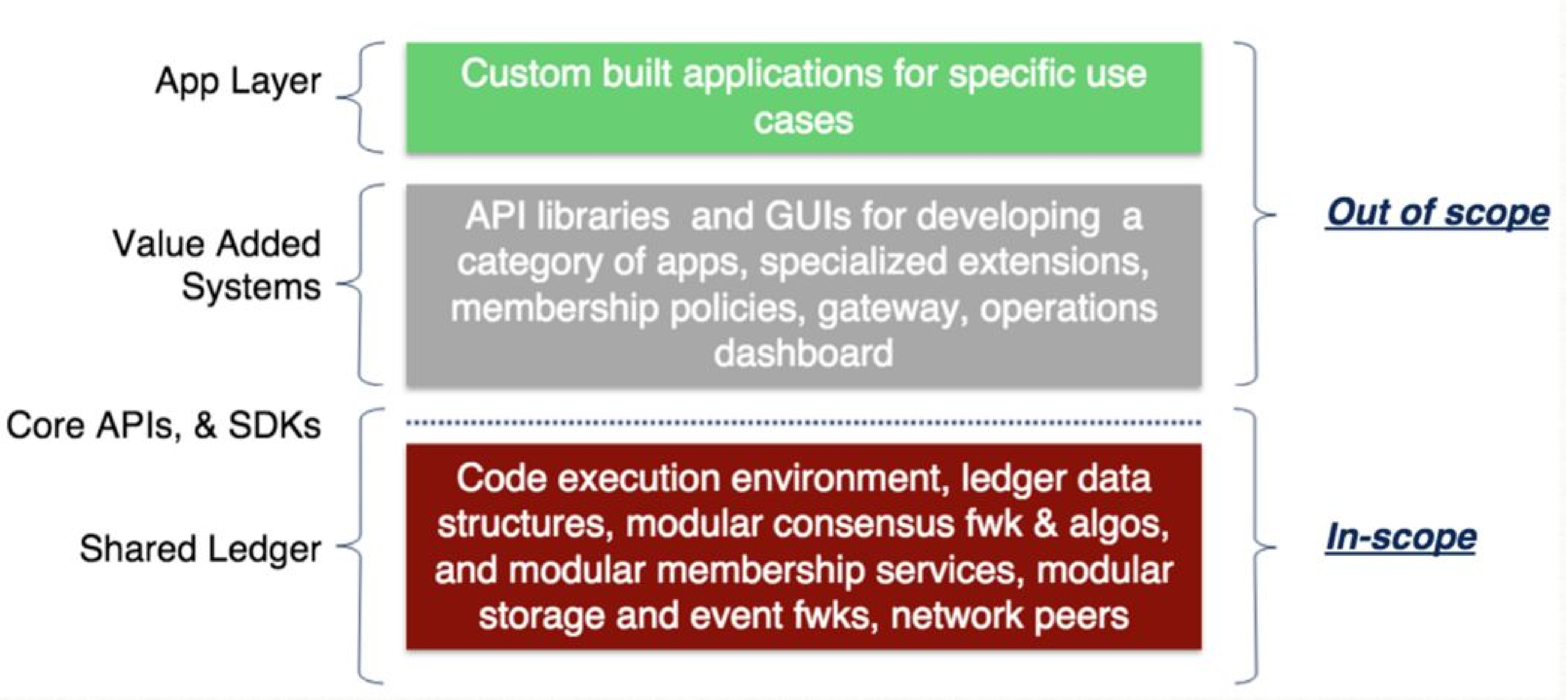
GENERAL

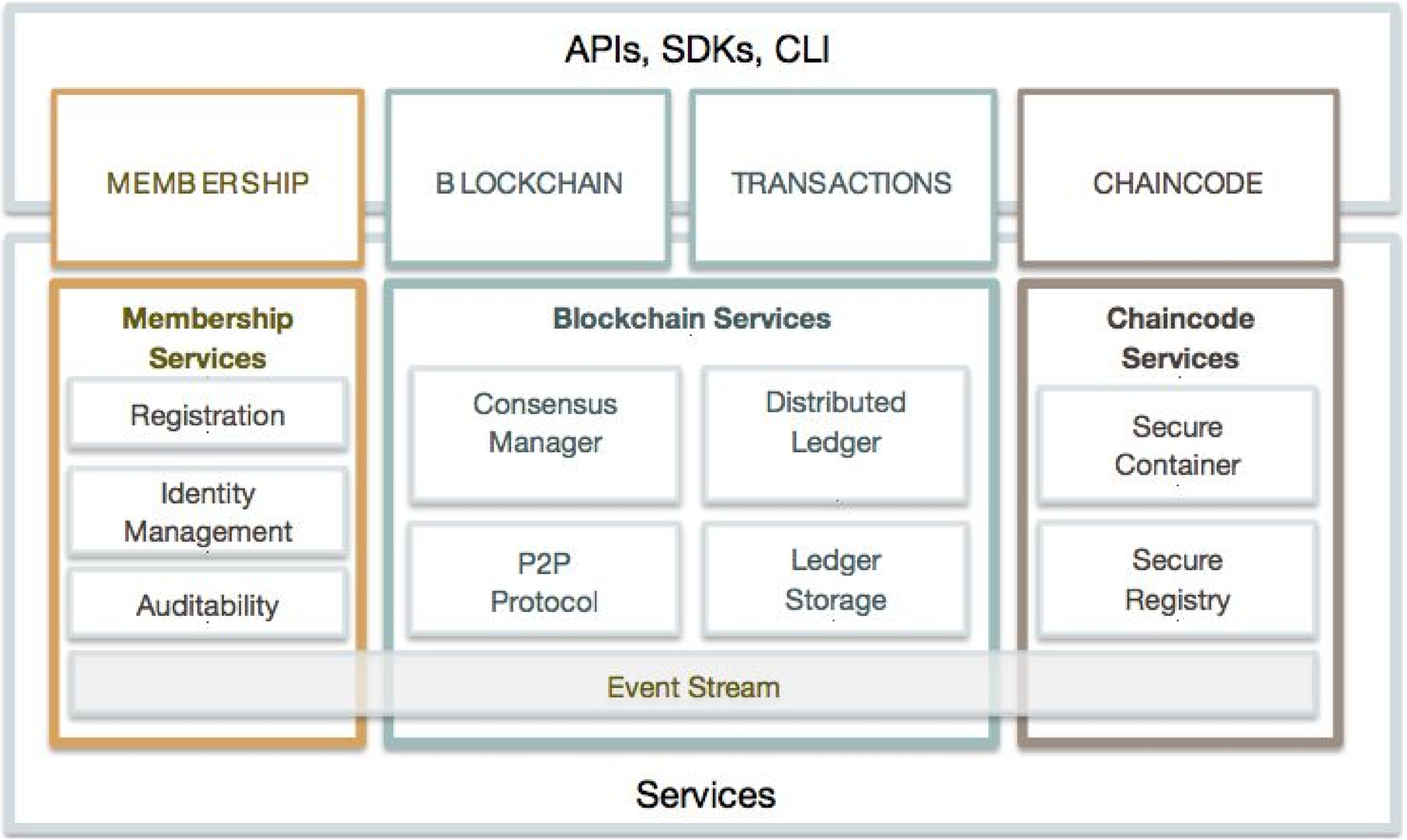
ABN·AMRO
ANZ
BLOCKCHAIN
Blockstream
bloq
BNY MELLON
Calastone
CISCO
CLS
Fundamental to FX
CONSENSYS
CREDITS
eVUE
digital labs
Gem
guardtime
intellect
itBit
Milligan Partners
ML
Orchestrating a brighter world
NEC
NTT DATA
redhat
Ribbit me
STATE STREET
SWIFT
symbiont
tequa creek
THOMSON REUTERS
vmware
WELLS FARGO

Why Hyperledger?

- Apache License 2.0
- Increasing demand for permissioned blockchain
- Some users/use cases require validating or non-validating nodes to be controlled or sometimes just sponsored by select whitelisted organizations
- Many network operators want transactors on network to obtain an identity from an issuing authority service on the network
- Need for private networks, as well as public networks.
- Performance / Scalability
- World of many networks… performance & scalability

Hyperledger's scope





Membership

Identity, privacy and auditability of blockchain participants

Blockchain | Transactions

Distributed transaction ledger whereby the ledger is updated by consensus (pluggable?)

Chain-Code

“Smart Contracts”, provide ability to run business logic against the blockchain

API, SDKs, CLIs

Gives us the ability to programmatically control the blockchain network

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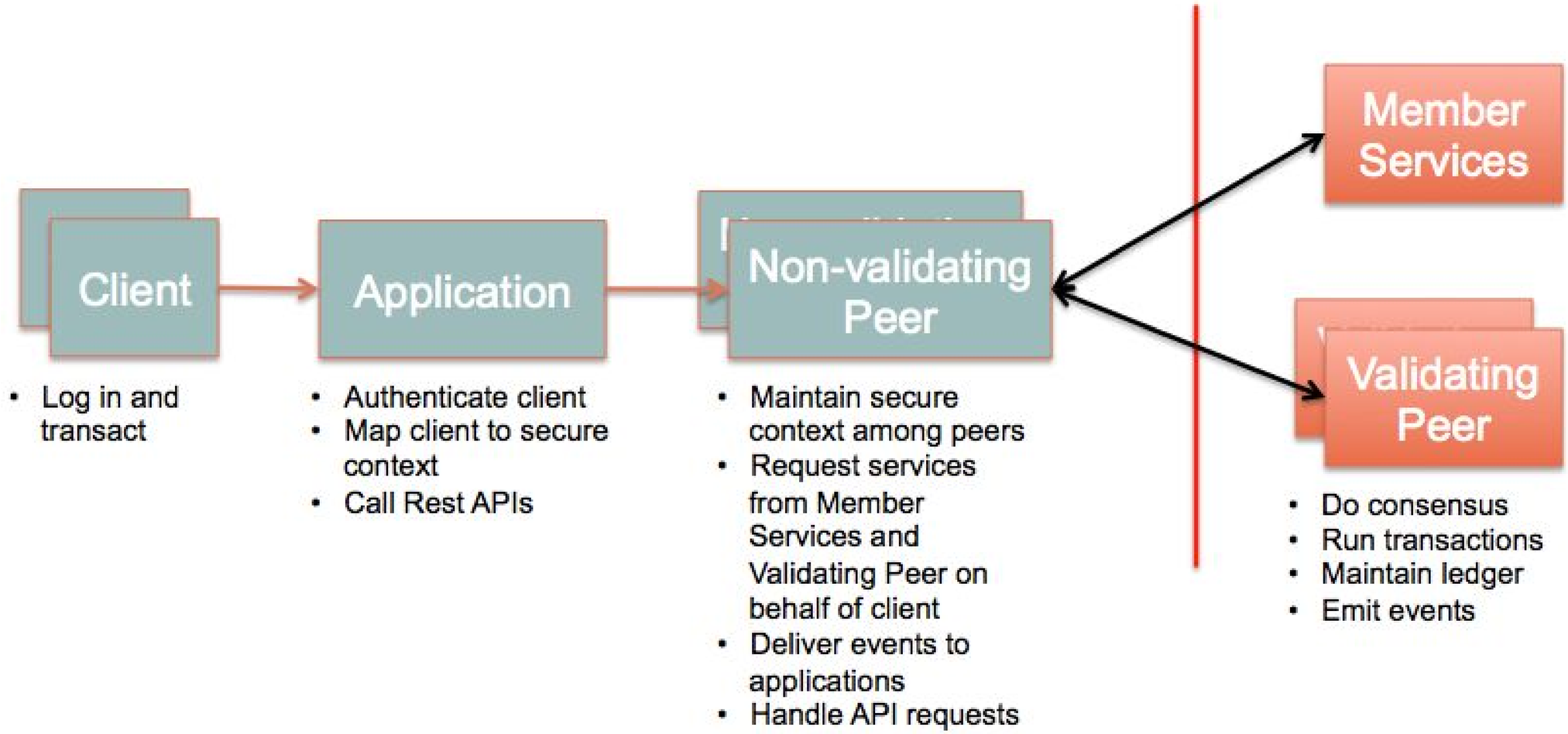
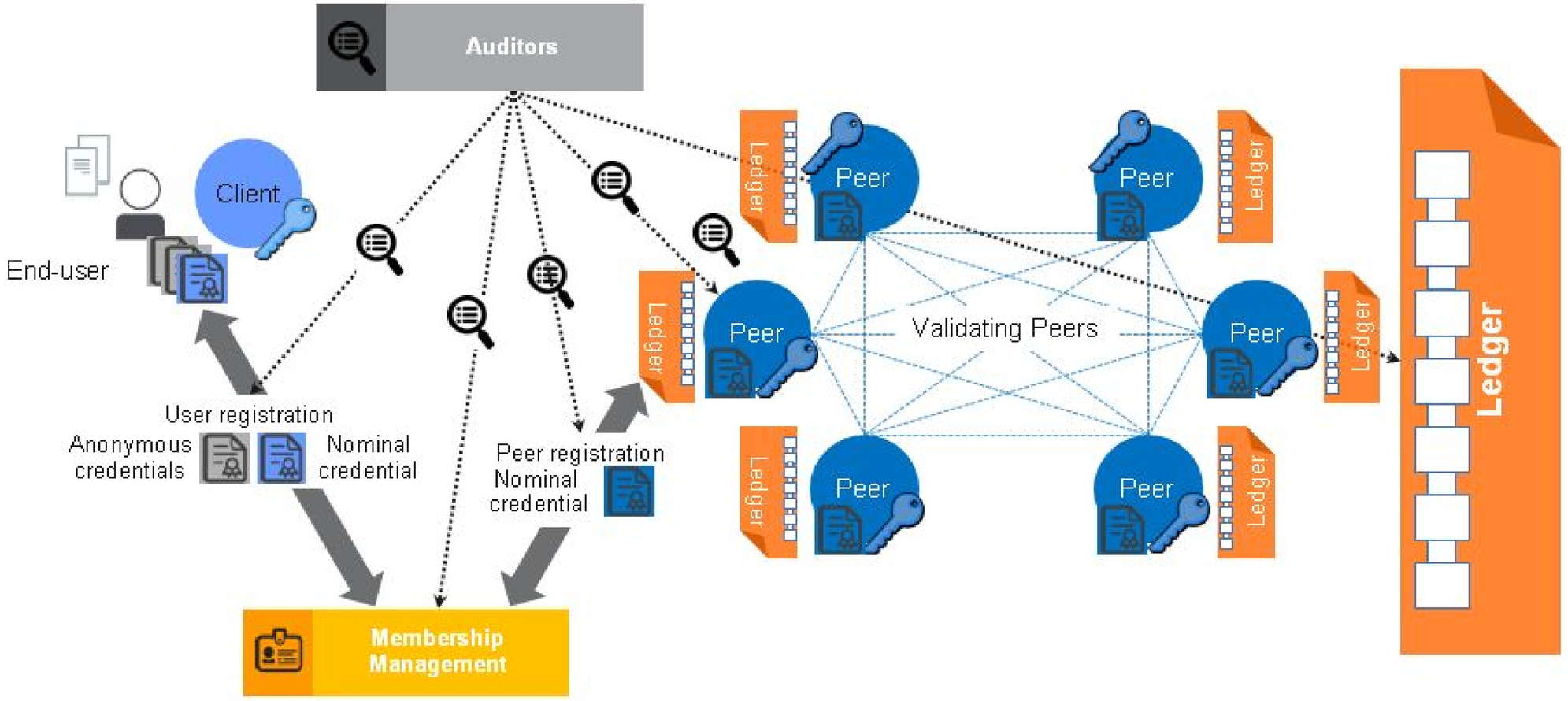
What is chaincode?

Chaincode is a piece of code that lets you interact with a network's shared ledger. Whenever you 'invoke' a transaction on the network, you are effectively calling a function in a piece of chaincode that reads and writes values to the ledger.

Hyperledger: Architecture



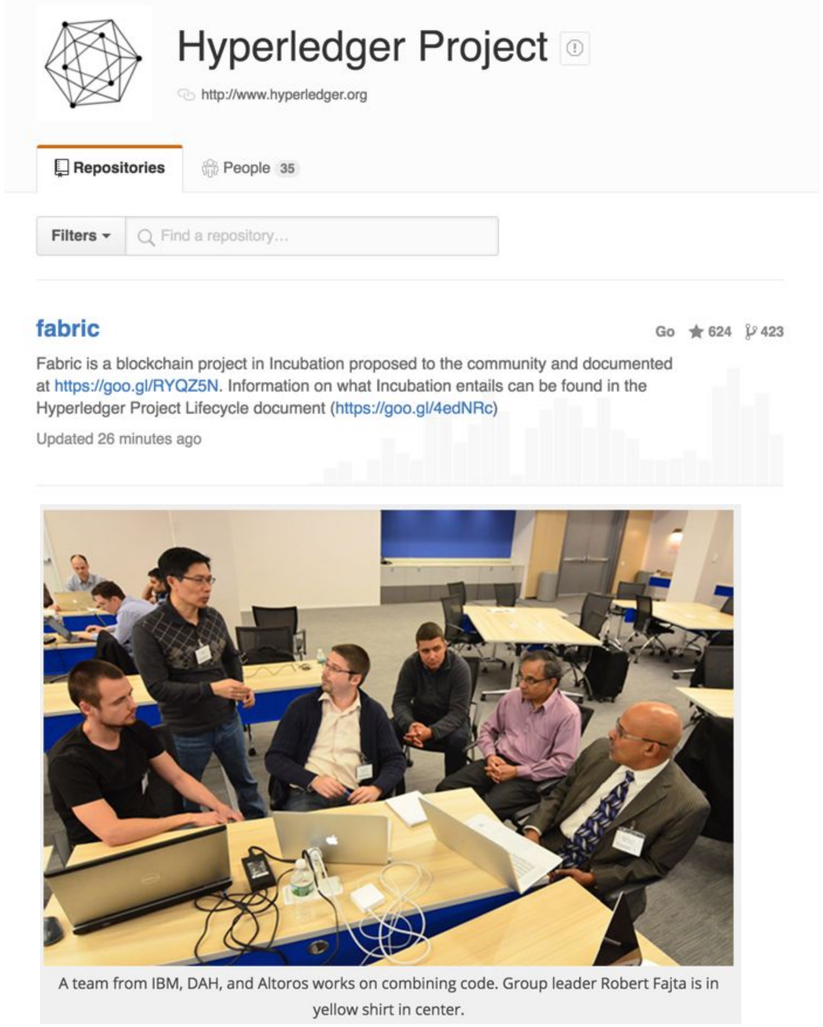
Permissioned - Multi peer



6 Proposed Code Contributions

- **IBM: Go**
- Digital Assets: Java
- Blockstream: C++
- Ripple:C++
- JP Morgan: Haskel
- Intel: Python

Hyperledger - Current Status



A team from IBM, DAH, and Altoros works on combining code. Group leader Robert Fajta is in yellow shirt in center.

Blockchain Energy Project Wins Consensus 2016 Hackathon

Pete Rizzo (@pete_rizzo_) | Published on May 1, 2016 at 23:43 BST

NEWS

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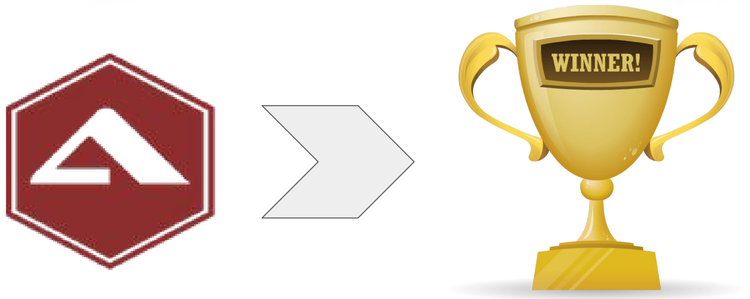

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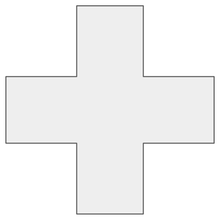
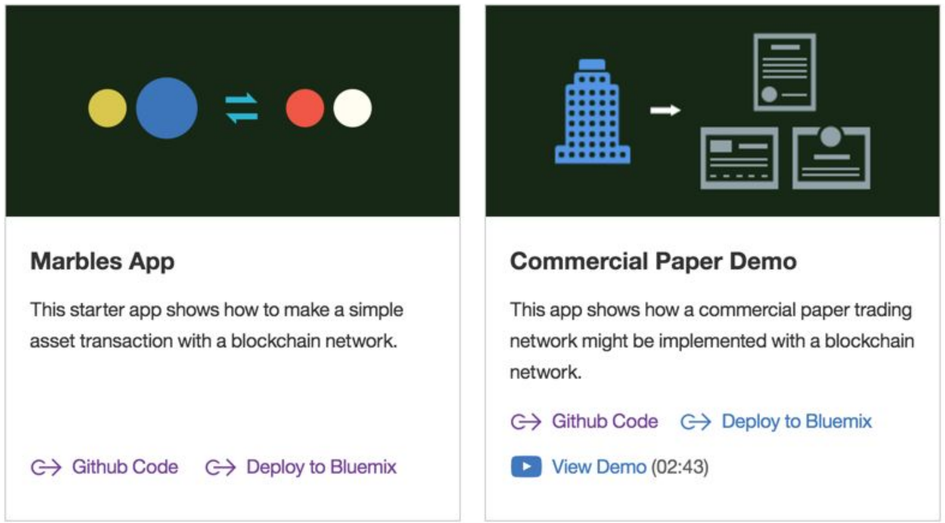
Time for a Demo?

Fast Demo: PaaS

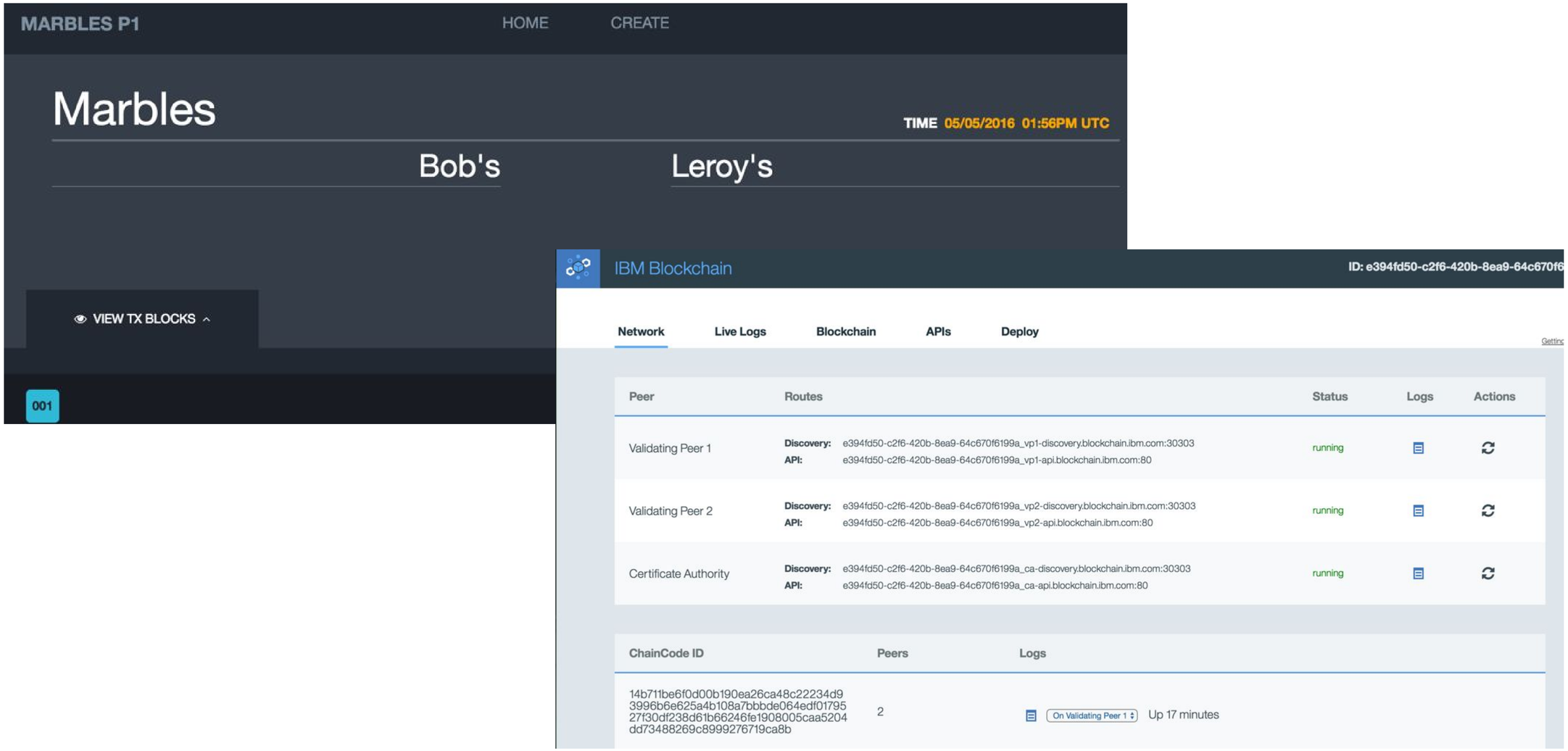




1. https://github.com/ibm-blockchain/marbles
2. Deploy to Bluemix
3. http://manu-marbles-demo.mybluemix.net
4. https://obc-service-broker-prod.mybluemix.net/v2/monitor

http://www.ibm.com/blockchain/for_developers.html

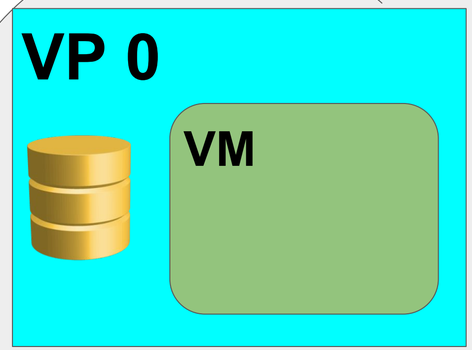
Marbles App


MARBLES P1
HOME
CREATE
Marbles
TIME 05/05/2016 01:56PM UTC
Bob's
Leroy's
VIEW TX BLOCKS
001
IBM Blockchain
ID: e394fd50-c2f6-420b-8ea9-64c670f6
Network
Live Logs
Blockchain
APIs
Deploy
Peer
Routes
Status
Logs
Actions
Validating Peer 1
Discovery: e394fd50-c2f6-420b-8ea9-64c670f6199a_vp1-discovery.blockchain.ibm.com:30303
API: e394fd50-c2f6-420b-8ea9-64c670f6199a_vp1-api.blockchain.ibm.com:80
running
Validating Peer 2
Discovery: e394fd50-c2f6-420b-8ea9-64c670f6199a_vp2-discovery.blockchain.ibm.com:30303
API: e394fd50-c2f6-420b-8ea9-64c670f6199a_vp2-api.blockchain.ibm.com:80
running
Certificate Authority
Discovery: e394fd50-c2f6-420b-8ea9-64c670f6199a_ca-discovery.blockchain.ibm.com:30303
API: e394fd50-c2f6-420b-8ea9-64c670f6199a_ca-api.blockchain.ibm.com:80
running
ChainCode ID
Peers
Logs
14b711be6f0d00b190ea26ca48c22234d9
3996b6e625a4b108a7bbbde064edf01795
27f30df238d61b66246fe1908005caa5204
dd73488269c8999276719ca8b
2
On Validating Peer 1
Up 17 minutes

Hard Demo: local

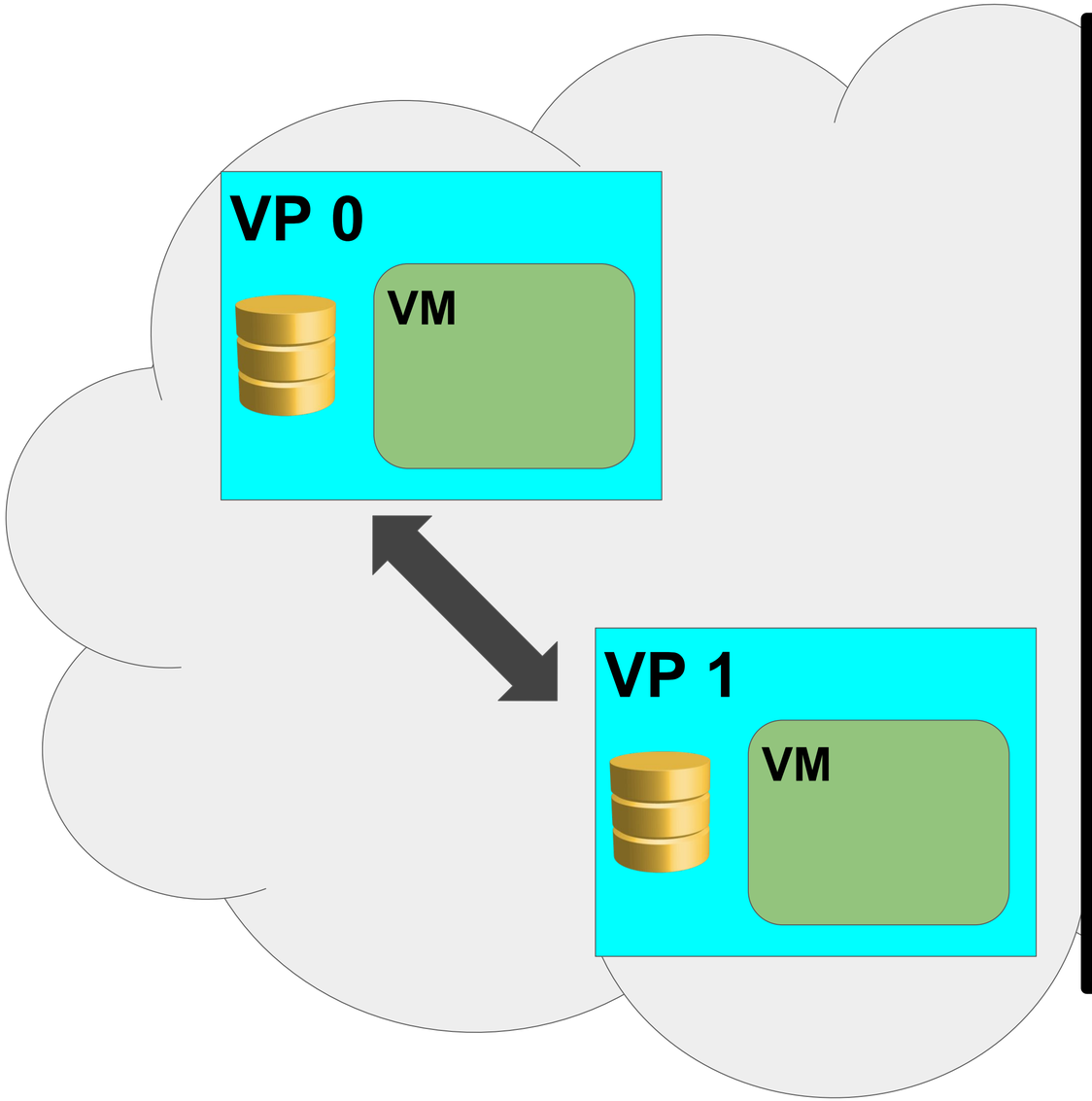
1. Setting up the development environment
   https://github.com/hyperledger/fabric/blob/master/docs/dev-setup/devenv.md
2. 3 Hyperledger peers
3. Deploy distributed app
4. Deploy the “chain-code”
5. Execute a few transactions

Step1: Create first validation peer




```
$vagrant ssh
$ ip add | grep docker
3: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu
1500 qdisc noqueue state DOWN group default
    inet 172.17.0.1/16 scope global docker0
$ docker run --rm -it hyperledger-peer
# export OPENCHAIN_VM_ENDPOINT=http://172.17.0.1:4243
# export OPENCHAIN_PEER_ID=vp0
# export OPENCHAIN_PEER_ADDRESSAUTODETECT=true
# ./peer peer
```

Step2: Create second validation peer

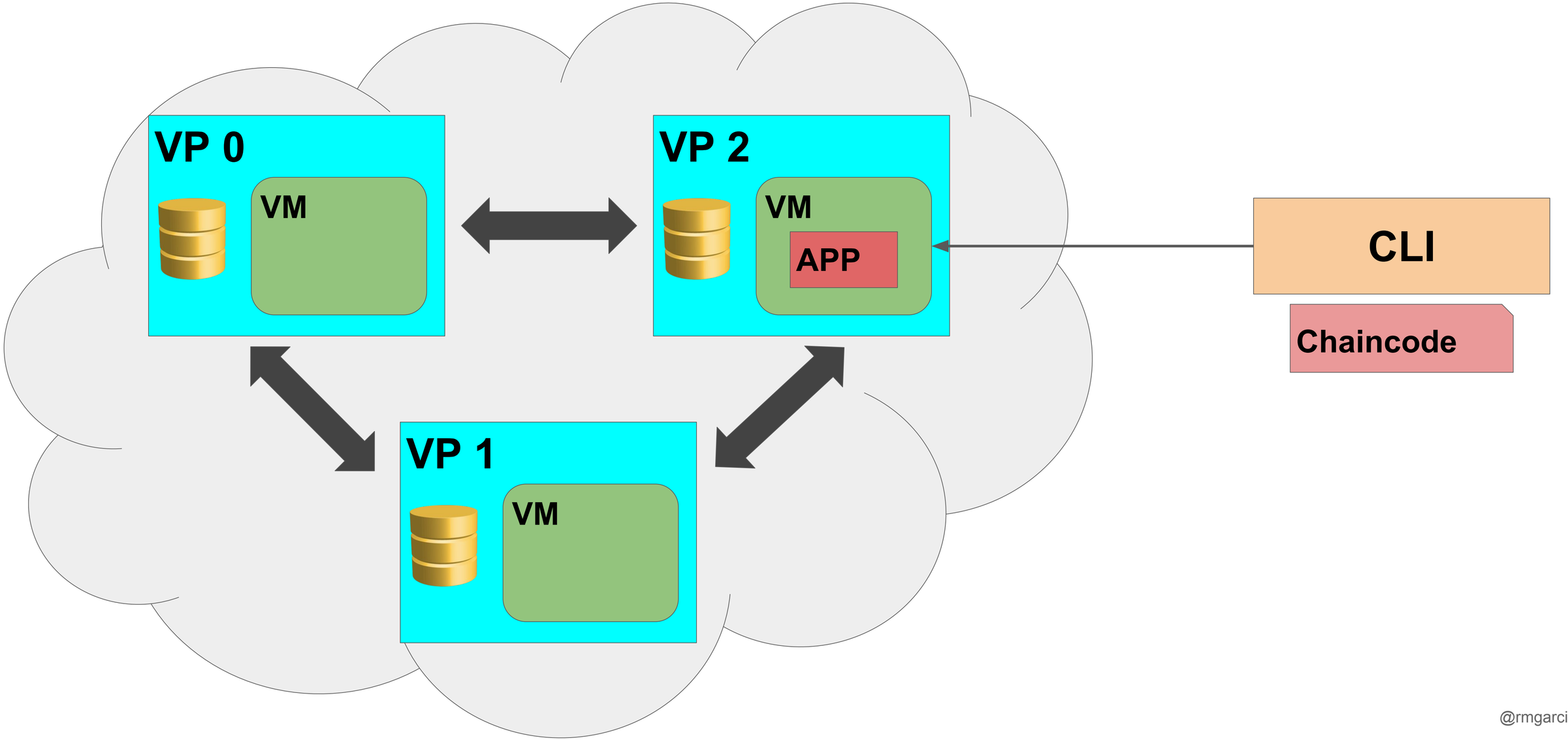



```
vagrant ssh
docker run --rm -it hyperledger-peer
export OPENCHAIN_PEER_ID=vp1
export OPENCHAIN_PEER_ADDRESSAUTODETECT=true
export OPENCHAIN_PEER_DISCOVERY_ROOTNODE=172.
17.0.2:30303
./peer peer
```

How peer discovery works?

1. VP1 sends DISC_HELLO message to its root discovery node (VP0)
2. VP0 replies with DISC_HELLO
3. Nodes start “chatting”
   a. Periodically sending DISC_GET_PEERS (asks to share active connections)
   b. Each node should reply with DISC_PEERS (list of connections)
4. After node receives new connections it starts chatting with them

Step4: Deploy application

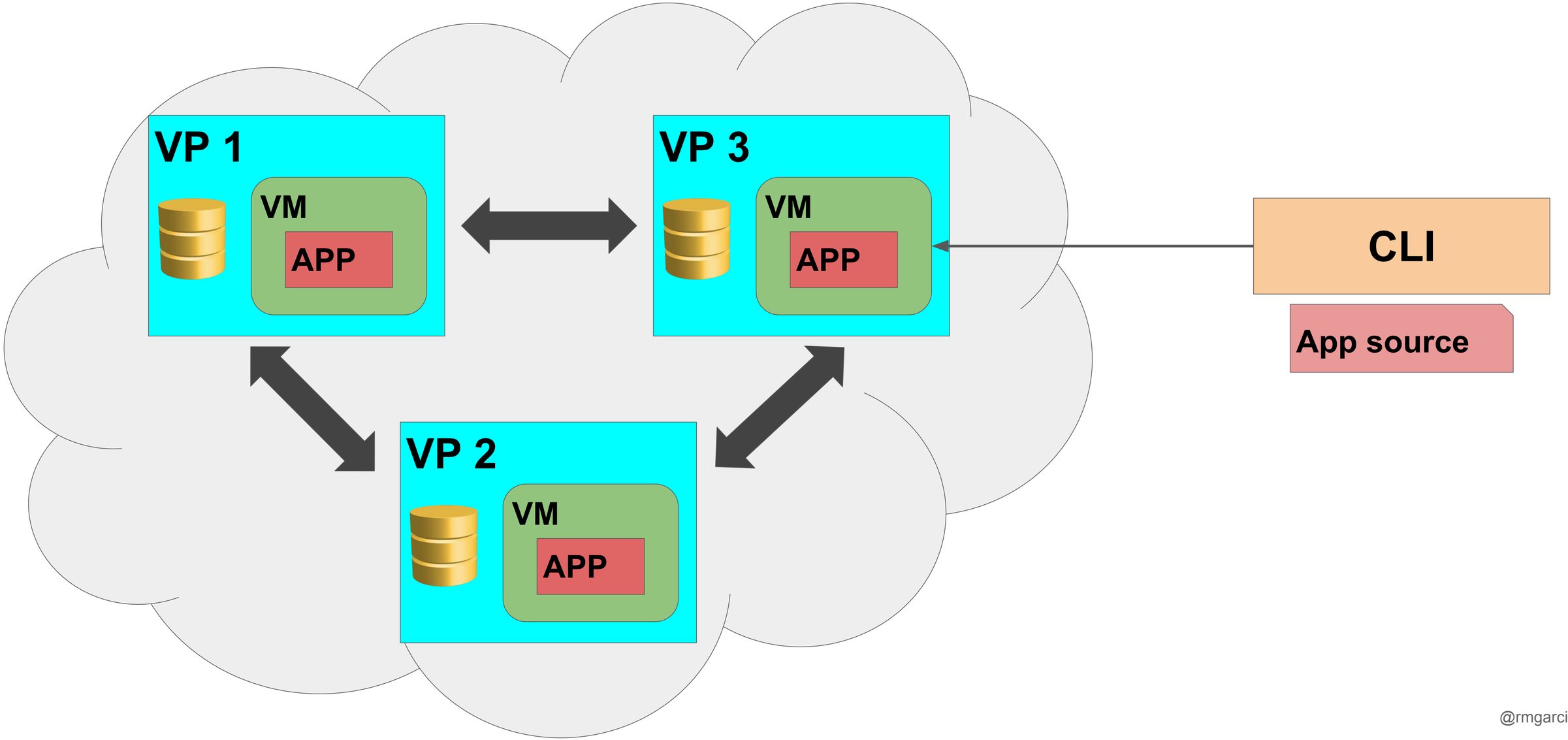


Step4: Deploy application

```
vagrant ssh
cd $GOPATH/src/github.com/hyperledger/fabric/peer
CORE_PEER_ADDRESS=172.17.0.2:30303 ./peer chaincode deploy -p github.
com/hyperledger/fabric/examples/chaincode/go/chaincode_example02 -c '{"Function":"
init", "Args": ["a","100", "b", "200"]}'
```

Will return ChainCode_ID to be used in further steps

Application is distributed across all peers



Step4: Execute transaction and Query results

```
cd $GOPATH/src/github.com/hyperledger/fabric/peer
CORE_PEER_ADDRESS=172.17.0.2:30303 ./peer chaincode invoke -n ChainCode_ID -c
'{"Function": "invoke", "Args": ["a", "b", "10"]}'


CORE_PEER_ADDRESS=172.17.0.2:30303 ./peer chaincode query -l golang -n ChainCode_ID -c
'{"Function": "query", "Args": ["a"]}'
```

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Hyperledger: Roadmap

Enterprise Integration

Performance and Scalability

Additional Consensus Plugins

Additional Languages

Portability

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WE'RE HIRING!

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